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SME Internalisation Index (SMINI) Based on the Sample of the Visegrad Countries

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Summary

The goal of the chapter is to develop an index (Small and Medium-Sized Enterprise Internationalisation Index – SMINI) to measure the degree of internationalisation in the SME sector, and to uncover its most important influencing factors. The index was calculated from a data set obtained from a questionnaire conducted among 1,124 firms from the Visegrad (V4) countries, comprised of 270 Polish, 597 Czech, 113 Hungarian and 144 Slovak firms. The relationship between the index value and the influencing factors was also tested using the same dataset. The influencing factors were chosen based on a literature review. We found that the factors suggested by the literature (company size, company age, ownership structure, innovation activity, network participation and sectorial structure) have a significant effect on the SMINI, but the strength of relationship is either weak or weak to moderate. A multiway ANOVA analysis revealed that three of our variables – firm size, family ownership and innovation – have an 11.8% combined effect on the SMINI.

Keywords: internationalisation, small and medium-sized enterprises, degree of internationalisation
JEL classification: F23, F61, L25, M16

2.1. INTRODUCTION

One of the main features of globalisation is the emergence of multinational enterprises. No wonder that when addressing the issue of corporate-level internationalisation most authors focus on the multinational firms, which are typically very large, employing several thousand people in various countries. But internationalisation is not limited to larger, multinational firms. An empirical study conducted by the Entrepreneurship Unit of the European Commission has found that 25% of the EU27's small- and medium-sized enterprises (SMEs) export, and 7% of them are either subcontractors of foreign firms, or have foreign subcontractors. The export activity is especially strong among larger SMEs: 24% of the micro firms export, 38% of the small ones, and 53% of the medium-sized ones (EC, 2010). The international activity of SMEs has not only been increasing in recent decades, but many authors suggest that firms that are internationally more active perform better and grow faster (e.g. EC, 2010; Mayer & Ottaviano, 2007; Prashantham, 2005; Siedschlag et al., 2010). It is therefore of key importance to understand what factors drive SMEs toward internationalisation.

Before the driving factors can be determined, the concept of internationalisation needs to be addressed. Because the focus is not on multinational enterprises but on SMEs, involvement in foreign direct investments cannot be used as the main criteria. We will therefore use the definition put forward by Welch and Luostarinen (1988), who defined the term 'internationalisation' as 'the process of increasing involvement in international markets' (p. 36). Exporting, involvement in international cooperation, and foreign direct investment can all be forms of corporate-level internationalisation. When comparing the degree of internationalisation of several firms, researchers usually use indicator sets and indices to determine which company is more internationalised. These indicator sets, and especially the indices, were typically developed for multinational enterprises. To counter this problem, we develop our own index (SMINI) which is then used to measure the degree of internationalisation of SMEs. The determinant factors of SME internationalisation are identified by testing the relationship between these factors and the SMINI value of the firms.

This chapter is made up of five main sections. The first one gives a literature review on the measurement of internationalisation, which is followed by a literature review on those factors that were found to influence internationalisation. In the third section we introduce our own index, called the Small- and Medium-Sized Enterprise Internationalisation Index – SMINI. The fourth section presents the relationships found between the SMINI and the various possible determinants of internationalisation. Finally, the chapter is closed with the main conclusions of our analysis.

2.2. LITERATURE REVIEW

Measuring corporate level internationalisation

The need to measure the internationalisation process of firms emerged when an ever increasing number of large firms invested overseas and became multinational. Although there is still no one single universally accepted definition for multinational enterprises, most academics and data-collecting agencies (like OECD or UNCTAD) tend to accept Dunning's suggestion as a threshold definition: "an enterprise that engages in foreign direct investment (FDI) and owns or, in some way, controls value-added activities in more than one country" (Dunning & Lundan, 2008, p. 3). Dunning and Lundan identify 7 criteria which have been generally used in the literature to assess the degree of an enterprise's internationality:

1. the number and size of foreign affiliates;
2. the number of countries in which the firm operates;
3. the proportion of foreign or global assets, sales, income or employment of the firm;
4. the internationalisation of the ownership or management of the firm;
5. the depth of foreign production, e.g. the value of research and development activities conducted abroad;
6. involvement in the control of international networks;
7. the extent to which responsibility in critical management issues (e.g. financial and marketing decisions) is devolved to foreign affiliates (Dunning & Lundan, 2008, p. 3).

Aharoni (1971) suggested as early as the beginning of the 1970s that multinational enterprises have at least three important dimensions: structural, performance and behavioural. Some of the sorting criteria listed by Dunning and Lundan can be easily put into Aharoni's categories: the first and second are structural indicators, and so is the employment proportion from the third one; the remaining items in the third criteria are performance indicators; while the fourth one can be interpreted as a behavioural indicator. The final three criteria are meant to measure the depth of the internationalisation, so they can best fit into the structural component, but they incorporate a complexity that goes beyond Aharoni's classification.

The geographical dimension of the internationalisation process also matters. Some of the structural indicators shed some light on the geographic structure, but they cannot distinguish between close and far away affiliates, or between affiliates operating in a similar or a different cultural and institutional environment. Schmidt (1981) used the Herfindahl index to measure the heterogeneity and homogeneity of a firm's international activities, to show how concentrated or equally spread out it is. In a similar attempt Perriard (1995) calculated a Gini index to measure how the regional distribution of a certain internationalisation indicator of a firm is similar to the total and global distribution of the same indicator. Ietto-Gillies (1998) developed the Network Spread Index, which shows the proportion of those countries where a firm

has an affiliate to the total number of countries receiving foreign direct investments. Rugman (2007) used sales data to show the most of the largest multinationals from the Triad (Japan, Europe and North America) concentrate their activity on their "home" region. In order to add cultural differences to the mix, Sullivan (1994) estimates the so called Psychic Dispersion of International Operation, which shows how many of the ten psychic zones of the world (Ronen & Shenkar, 1985) a firm has subsidiaries in.

Besides the structural, performance, behavioural and geographical (environmental) dimensions, Fischer (2006) mentions two more: strategy and resources (Sommer, 2009). The last three criteria of Dunning and Lundan fit best into the strategy category.

The indicators mentioned so far all measure a single dimension of multinational enterprise internationalisation. Using only one measurement method as an indicator of internationalisation can be misleading. Shoham (1998) found in his study that no single indicator can be a reliable measure of export performance. Most studies use internationalisation indices or a combination of several indicators to make the measurement more reliable.

One the better known such indices is the Transnationality Index (TNI) compiled by the United Nations Trade and Development Conference (UNCTAD, 2014). It is calculated as the average of two performance indicators and one structural indicator:

$$TNI = \frac{\frac{foreign\ assets}{total\ assets} + \frac{foreign\ sales}{total\ sales} + \frac{foreign\ employment}{total\ employment}}{3}$$

Ietto-Gillies (1998), with the use of the Network Spread Index (NSI) mentioned above, developed the Transnational Activities Spread Index (TASI). The TASI is a modified version of the TNI:

$$TASI = TNI * NSI$$

The TASI gives a better picture of the true internationalisation of the firm, especially in the case of regional enterprises. If a company has its headquarters in Luxembourg, but most of its activity is conducted in Germany, the TNI will have a very high value, even though it is not a global enterprise. If, however, the previous index is multiplied by the NSI, the result is a more realistic indicator value.

Neither the TNI nor the TASI consider cultural differences. A third index, developed by Sullivan (1994), uses the psychic dispersion index (PDIO) and a ratio showing the international experience of top managers to incorporate cultural elements into the measurement. Sullivan's Degree of Internationalisation (DOI) is yet again a modified version of the TNI:

$$DOI = TNI * PDIO * \frac{number\ of\ years\ worked\ abroad\ by\ top\ managers}{total\ number\ of\ years\ of\ working\ experience\ of\ top\ managers}$$

Many studies simply use a combination of internationalisation indicators instead of an index. Sommer (2009) mentions a study conducted by Lesch (2005) among firms of the German Stock Exchange (DAX), where the following aspects were measured: proportion of foreign sales and number of persons employed abroad; spread of foreign subsidiaries; owner structure; international experience of the board members. Heiltjes et al. (2003) observed the internationalisation of 80 Danish and Swedish firms with two indicators: proportion of foreign sales and foreign executive board members.

Measuring SME Internationalisation

Because the most widely accepted definition of multinational enterprises focuses on foreign investments and foreign affiliates, the most commonly used measurement methods also concentrate on some aspect of the foreign subsidiaries. As a result of globalisation, however, the rate of internationalisation has sped up not only among multinational enterprises, but also among small and medium-sized firms. Most of these SMEs do not own foreign affiliates, but a considerable number of them are engaged in international activities. A study conducted among SMEs in the EU27 (EC, 2010) has found that while only 2% of the SMEs were active in foreign direct investment in 2009, 25% of them were exporters, and half of the exporters sold their goods and services beyond the borders of the European Internal Market.

The classical internationalisation indicators and indices cannot be used for SMEs because of the lack of foreign affiliates. As import and export are the most common forms of internationalisation, the basic indicator is whether or not an SME engages at all in importing or exporting activities. More precisely, importing is usually considered to be too simple a form, so the analysis is focused on the exporting activities.

Some of the more sophisticated indicators include the intensity of exports (share of exports from the total sales of the company) and the geographical scope of exports (the number of countries/regions a company exports to). Cerrato & Piva (2012) use four variables to measure the internationalisation of Italian SMEs: 1) engaged in exports (yes-no); 2) export intensity, 3) geographical scope (number of regions the firm exports to, where the regions are the following: EU15; EU25; other European countries; North America; Latin America; China; rest of Asia; Africa; Australia); sales-based entropy index (combining the previous two). The study by the EU Entrepreneurship Unit (EC 2010) measured the entry mode (technological cooperation, subcontracting) in addition to the exporting activity of SMEs.

Table 2.1. summarises the possible indicators that may be used to measure SME internationalisation.

Table 2.1. Possible indicators for SME internationalisation

Dimension	Indicator
Structural	-
Performance	Export intensity
Behavioural	(Foreign) experience of entrepreneur/manager Ownership structure
Geographical	Geographical scope
Strategy	Complexity of strategy Entry mode
Resources	-

Source: own compilation based on dimensions by Sommer (2009) and by Fischer (2006) p. 83

Determinants of Internationalisation

Some of the most commonly mentioned factors that are related to the internationalisation of SMEs are the following: firm size; ownership structure; involvement in cooperation; innovation characteristics. This paper also tests the effects of these factors, but this section gives a brief summary of what other studies have found.

Size

It is a well-established fact that the larger the company size is, the better opportunity this company has to enter international markets (EC 2007). Based on a survey of 9,480 SMEs from 33 European countries, it can be concluded that not only the involvement in international activities but also the mode of internationalisation is closely related to the size of the companies. The larger the firm is, the more complex the solutions it is likely to apply (EC, 2010).

Ownership structure

As far as ownership structure is concerned, the two focal points of research have been the analysis of family-owned and externally-owned businesses. Family ownership has been found to have a significant effect on the performance and the degree of internationalisation of the firms, but the there is no agreement on the direction of the effect. Zahra (2003) found that family ownership and the presence of family members in the management in 490 US manufacturing firms positively correlated with the export intensity, and also with the number of countries the firm was active in. Other papers suggest that family-owned firms are more risk averse, and so they are either less likely to go international, or make that decision later than other enterprises (Gallo & Garcia Pont, 1996). Fernandez & Nieto (2006) found a negative relationship between family ownership and export intensity in a sample of Spanish SMEs. Based on data obtained from 1,324 Italian manufacturing SMEs, Cerrato & Piva (2010) also show that the involvement of family members in the management negatively affects the export intensity of the firm.

External ownership, and foreign ownership as a special case, is positively correlated with the internationalisation of the firm. George et al. (2005) claim that externally-owned firms can make better decisions in strategic issues (like internationalisation). Utilising panel data for the 102 largest German manufacturing firms, Oesterle et al. (2013) conclude that the relationship between the concentration of ownership and the degree of internationalisation is non-linear, U-shaped. This means that the stake of the largest external owner influences the internationalisation strategy of the firm. Using a data set of 434 companies with foreign investment located in Hungary, Poland, Slovakia, Slovenia and Estonia, Filatotchev et al. (2008) show that foreign investor ownership is positively associated with export intensity.

Innovation

Most studies have found a positive connection between innovation activity and internationalisation. Siedschlag et al. (2010) reported that exporters were more likely to invest in innovation, and they were more likely to be more successful in terms of innovation output. They explained the phenomenon by the opportunity for exporters to get access to external knowledge flows. After conducting a qualitative study among 30 British knowledge-intensive and traditional firms, Bell et al. (2004) suggest that knowledge-intensive firms are much more likely to experiment with foreign markets. In fact, one of the knowledge-intensive firms in their sample only became active on the domestic market after more promising opportunities had been exploited abroad. Altomonte et al. (2014) analyse a data set of manufacturing firms from seven European countries and conclude that there is a strong positive association between internationalisation, innovation and productivity.

Networks

The personal experience and professional knowledge of owners/managers and employees play a major role in internationalisation; beside these, the economic and social networks around the company also have a decisive role in this process. According to one study, small businesses prefer a cooperative strategy in internationalisation, and they gain additional resources and information from the network they participate in (Gemser et al., 2004). Some researchers think that the number of decision makers is of determining importance in terms of internationalisation as well (Clercq & Bosma, 2004). They consider that the more decision makers are involved, the more networks they can access, the more experience they can gain and the more knowledge they can generate.

As far as the form of cooperation is concerned, informal networks play a more emphasised role in the case of small enterprises than in medium-sized or larger enterprises. As the size of the company increases, formal relationships gain more importance, at the cost of informal ones (Gubik, 2008).

2.3. MATERIAL AND METHODS

The chapter presents the results of the research project No. StG-21310034 (Patterns of Business Internationalization in Visegrad Countries – In Search for Regional Specifics) financed by the International Visegrad Fund in the years 2013-2014. The data was obtained from a survey (an e-mail or a telephone conversation request followed by an online password protected questionnaire[1]) conducted among 1124 firms from V4 countries, including 270 Polish firms, 597 Czech firms, 113 Hungarian firms and 144 Slovak firms (For more detailed information on the survey see Duréndez & Wach, 2014; Kiendl-Wendner & Wach, K. 2014; Daszkiewicz & Wach 2014).[2]

The sample does not represent Visegrad Group companies since this was not the purpose of the data collection. A sample with the same ratio of different company size groups would have encompassed mainly micro-sized enterprises, which were less active internationally and would have been less suitable for achieving the goals of the research. The purpose of this survey was to include an approximately similar amount of companies of different sizes in the research, which is why large and internationally active companies are over-represented in the sample. When evaluating the results of this study this fact has to be considered because it may affect the generalisability and applicability of the results.

Sample Characteristics

As for company size, approximately 24.5% of companies were micro-sized enterprises, 42.1% were small-sized enterprises, 21% were middle-sized companies and 12.5% were large companies. Most companies were founded after 1990, less than 10.8% had been in business longer than 25 years. Only 47.2% of companies reported that the business was a family business. According to our definition, these are firms that are solely (or dominantly) owned by the same family, employ family members or are active in supporting the business processes of the family members. In our database 684 (61%) of companies are owned by domestic investors and 131 (11.7%) of companies are 100%in foreign ownership.

As for the business activities of the surveyed companies, the ratio of industrial companies are 39.6%, 40.2% are service providers, 16.5% are trade companies and 3.5% are involved in agricultural activities. Within the industrial firms, construction and manufacturing were the most often mentioned economic activities. Besides them, companies with professional, scientific and technical activities and information and communication technology firms are also overrepresented.

[1] The online questionnaire was available at <http://www.visegrad.uek.krakow.pl/survey>. The questionaire is attached in Duréndez & Wach (2014, pp. 239-244).

[2] More details on the research project can be found at: http://www.visegrad.uek.krakow.pl/

SME Internationalisation Index

Based on the literature review we have found four relevant dimensions whose factors can be used to measure the internationalisation degree of SMEs (Table 2.1.). In this study we operationalise these four dimensions using eight variables gained from our questionnaire (Table 2.2.).

Table 2.2. Operationalisation of the SME Internalisation Index (SMINI)

Dimension	Indicator	Variable	Type of variable
Performance	Export intensity	Percentage of total revenue that comes from export	Percentage
Behavioural	Attitude of the owner/entrepreneur/ manager	Motivation to go international Cosmopolitism and international openness Knowledge of international markets Experience in international markets Professional business experience in general	Likert scale, 1-5
Geographical	Geographical scope	Territorial scope of the firm	National/neighbouring/ EU/EU&beyond/ beyond EU
Strategy	Complexity of the strategy	Planned strategy for internationalisation	No/not formalised/formalised

Source: own compilation

The four dimensions were compiled into one index value. In order to be able to add them as a component of the same index, the variables were recoded in the following way:

- Export intensity (EI): original values divided by 100.
- Attitude of the owner/entrepreneur/manager (A): this element was obtained as the average of five variables measured on a Likert scale (1-5).
  1. The answers were rescaled to 0-4, where the 0 value was assigned to the response “extremely low” (so that negative attitudes do not increase the value of the index);
  2. An average was calculated from the five variables (the average of the individual values for motivation, cosmopolitism, knowledge etc.);
  3. Finally, the average was recalculated to have a value between 0 and 1.
- Geographical scope (G): 0 value for national market activity; 0.25 value for only neighbouring countries; 0.5 for solely within EU markets; 0.75 for EU markets and beyond; 1 for only beyond EU markets.
- Complexity of strategy (S): 0 value for no planned international strategy; 0.5 for non-formalised international strategy; 1 for formalised internationals strategy.

The final index was calculated as the unweighted average of the four dimensions:

$$SMINI = \frac{EI + A + G + S}{4}$$

Although the four variables are meant to measure four different dimensions of internationalisation, there is a weak-moderate correlation among the four components. Because the relation is not strong, the individual components can shed light on different aspects of internationalisation, and so the featuring of them in the index can be justified.

2.4. RESULTS AND DISCUSSION

General SMINI Characteristics

From the 1124 respondent firms 984 were micro, small or medium-sized, for which the SMINI was compiled. Some of the answers were not complete, and some of the firms were not involved in international activities, which meant that the index value was actually calculated for 710 firms. The overall SMINI value in the Visegrad countries was 0.4432, with a minimum of 0 and a maximum of 0.94. Mean SMINI values for different sizes of companies and different countries are given in Table 2.3.

Table 2.3. The SMINI values of Visegrad country SMEs

Country	Size	Mean	N	Std. Deviation
Poland	Micro	.4760	48	.20199
	Small	.5211	49	.16134
	Medium	.5585	63	.18888
	Total	.5223	160	.18707
Czech Republic	Micro	.3527	67	.18039
	Small	.3814	213	.20042
	Medium	.5037	88	.21789
	Total	.4054	368	.20848
Slovak Republic	Micro	.3758	50	.24281
	Small	.4486	46	.17892
	Medium	.5421	28	.21926
	Total	.4403	124	.22322
Hungary	Micro	.3505	19	.24299
	Small	.4898	23	.20600
	Medium	.5862	16	.20039
	Total	.4708	58	.23303

The degree of internationalisation is highest in Poland (SMINI=0.5223), and lowest in the Czech Republic (SMINI=0.4054), according to the SMINI calculated from our dataset (Table 3). The picture becomes more complicated if company size is considered as well, because the Hungarian medium-sized companies are the most internationalised (SMINI=0.5862), while the Hungarian micro firms are the least internationalised (SMINI=0.3505).

Determinants of Internationalisation

Company Size and Age

It is common knowledge that the likelihood of a firm going international increases with its size (measured by the number of people employed). Our study also supports this finding (Eta=0.266, p=0.000), however the relationship is surprisingly low. This is explained by the fact that only SMEs were tested. If large companies are also included in the test, the Eta value increases to 0.385. The importance of traditional barriers of internationalisation (lack of proper market information, geographical and cultural distance, etc.) is decreasing in the Internet age, which makes it much easier for smaller firms to go international.

We found that the more resources a company has (financial, human, physical and information resources were tested) the higher SMINI value it has. Companies were asked to evaluate their internal resources for the internationalisation process on a 1-5 Likert scale. Although there is a significant positive correlation between the size of companies and the resources companies have, the size itself is not able to explain the differences in SMINI values. If we hold the size variable constant, a significant positive relationship remains between the availability of resources and index values. The strongest correlations can be found for human resources (Partial Correlation=0.483, p=0.000) and information (Partial Correlation=0.410, p=0.000).

The correlation between the SMINI and the age of the company (the year the company was established) is surprisingly low as well (Pearson coefficient=-0.097, p=0.01). General business experience accumulated with the operation of the firms does not seem to affect the degree of internationalisation.

Ownership Structure

The effect of ownership on internationalisation was tested with two variables: family ownership (firms that are solely (or mostly) owned by the same family and in which they are employed or at least active in supporting the business processes of the family members), and foreign ownership. The former was measured as a dichotomous variable (yes/no); the latter was given as a percentage of total assets.

Family ownership has a significant but weak effect on the SMINI (Eta=0.12, p=0.01).The relationship is negative, which means that the degree of internationalisation is higher in non-family-owned businesses.

Foreign ownership is positively correlated with the SMINI (Pearson correlation=0.30, p=0.000). The higher the foreign ownership stake in the company, the higher the SMINI value is.

Innovation

The effects of two phenomena were analysed: the innovation activity of the firm, and the level of innovation in the industry. The former was measured by two variables: 1)

whether the firm had implemented any innovation in the last 3 years; 2) the scope of the implemented innovation(s) (on a firm, regional, national, worldwide scale). Both variables have a significant positive effect on the SMINI (Eta=0.203 for innovation implemented, and Eta=0.239 for the scope of implementation; p=0.000 in both cases). The fact that a firm has implemented some sort of innovation increases the degree of internationalisation, and so does the scope of implementation. The bigger the market where a new solution was introduced, the higher SMINI values can be expected.

The level of innovation in the industry was measured as a perceived level by the respondents: Do the firms in your industry implement much innovation (1-5 Likert scale). The Spearman's rho=0.195 (p=0.000) indicating a weak correlation between the SMINI and the perceived level of innovation in the industry.

Sectoral Structure

SMEs operating in manufacturing and transporting and storage are the most internationalised in our sample, with a SMINI value of 0.506. Information and communication comes third with a 0.489 SMINI. The sectors where the sample consists of a relatively high number of companies with a low SMINI value are the construction industry (0.384) and the wholesale and retail sector (0.397, see Table 2.4.).

Table 2.4. Sectoral SMINI values

	V4	PL	CZ	SK	HU	N
Manufacturing (C)	.5057	.5429	.4687	.5188	.5623	194
Transporting and storage (H)	.5056	.5400	.4678	.5514	-	45
Information and communication (J)	.4886	.5171	.4770	.4583	.5719	52
Activities of extraterritorial organisations and bodies (U)	.4875	-	-	-	.4875	1
Mining and quarrying (B)	.4839	.3075	.5000	.5456	.5125	11
Professional, scientific and technical activities (M)	.4822	.5348	.4083	-	.5929	38
Administrative and support service activities (N)	.4820	.5063	.4466	.3000	.7438	16
Other service activities (S)	.4519	.4937	.4390	.3688	.5623	136
Education (P)	.4450	.4675	.4442	.0875	.6188	19
Agriculture, forestry and fishing (A)	.4179	.5790	.5790	.4385	.4381	34
Water supply; sewerage; waste management and remediation activities (E)	.4102	-	.3125	.6875	.4750	11
Financial and insurance activities (K)	.4093	.3313	.5042	.3338	.4167	10
Accommodation and food service activities (I)	.4002	.5292	.2463	.6688	-	11
Wholesale and retail trade; repair of motor vehicles and motorcycles (G)	.3968	.5261	.3558	.3367	.3533	158
Construction (F)	.3838	.4928	.3476	.4667	.3573	102
Electricity, gas, steam and air conditioning supply (D)	.3800	.7375	.3763	.3083	.2750	15
Arts, entertainment and recreation (R)	.3669	.4281	.3273	.4308	-	18
Human health and social work activities (Q)	.3580	.4563	.4563	.2813	-	11
Real estate activities (L)	.2438	.1375	.2063	-	.4250	4
Activities of households as employers (T)	.2025	-	.2025	-	-	1

Source: own calculations

There are considerable differences among the countries (e.g. in Poland and the Czech Republic agriculture has a higher SMINI than manufacturing; the most industrialised sector from the categories with a significant number of companies varies: agriculture in the Czech Republic and Poland, transporting and storage in Slovakia, and professional, scientific and technical activities in Hungary), but these results might be distorted by the non-representativeness of the sample.

Network Effect

The questionnaire consisted of the following question: While going international, do you operate in any formal or at least informal networks? There were three possible answers to choose from: 1) we do not cooperate in any international and/or national networks for internationalisation; 2) we operate in at least one informal network, which helps us in the internationalisation process; 3) we operate in at least one formal network, which helps us in the internationalisation process. These three options were used to test the effect of networks on internationalisation. There is a significant but weak relationship between the SMINI and network variable (Eta=0.175; p=0.000). A larger SMINI value is gained even if the firm is only part of an informal network, and the partnership in a formal network further increases the index value.

This positive relationship is only true for small and medium-sized corporations. In the case of the micro firms the highest SMINI value is achieved by those which are engaged in informal cooperation (see Figure 2.1.). Micro firms tend to avoid formal solutions anyway, because they can increase costs, and decrease the flexibility of operation.

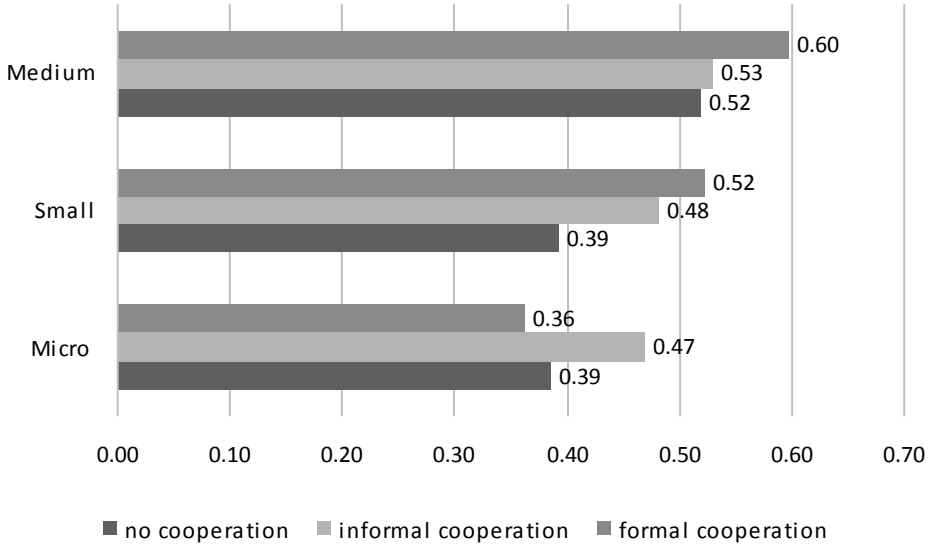

Figure 2.1. SMINI values according to firm size
Source: own compilation

Multiway ANOVA analysis

We have found several variables that are significantly related with the SMINI. These relations, however, were only calculated in pairs, and so the method of analysis is not suitable to show the combined effect of the independent variables. A multiway ANOVA analysis can be used to measure the effect of more independent variables on one single dependent variable (SMINI). Table 6 shows the combined effect of three variables: firm size (three categories – micro, small, medium), family ownership (yes/no) and innovation activity (Has your firm implemented any innovation in the last 3 years?). Two variables (network effect and foreign ownership) had to be left out of the model because of the variance homogeneity condition. Table 2.5. shows that the variance homogeneity condition is fulfilled (Sig=0.964) in the three-variable model.

Table 2.5. Levene's Test of Equality of Error Variances

F	df1	df2	Sig.
.378	11	698	.964

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
Source: own calculations

All three model variables have a significant effect on the SMINI (Sig.=0.000 and 0.006). The interaction between the independent variables on the other hand does not influence the SMINI value (the level of significances are higher than 0.05 in case of Size * Family ownership, Size * Innovation, size * Innovation, Family ownership * Innovation and size * Family ownership * Innovation).

Table 2.6. Multiway ANOVA analysis of the SMINI and the size, family ownership and innovation variables

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3.820[a]	11	.347	8.507	.000	.118
Intercept	84.180	1	84.180	2062.296	.000	.747
Size	.820	2	.410	10.049	.000	.028
Family ownership	.306	1	.306	7.497	.006	.011
Innovation	.957	1	.957	23.454	.000	.033
Size * Family ownership	.130	2	.065	1.596	.203	.005
Size * Innovation	.054	2	.027	.667	.514	.002
Family ownership * Innovation	.023	1	.023	.558	.455	.001
Size * Family ownership * Innovation	.003	2	.001	.037	.964	.000
Error	28.491	698	.041			
Total	171.772	710				
Corrected Total	32.311	709				

R Squared = .118 (Adjusted R Squared = .104)
Source: own calculations

The combined explanatory power of the three variables is 11.8% (R Squared = 0.118). The results suggest that there can be other factors that influence the degree of internationalisation. These factors however could not be involved in the model and/or they were not measured by the questionnaire.

Figure 2.2. shows the profile plots of the variables. The line graphs illustrate the positive relationships between the independent variables and SMINI index.

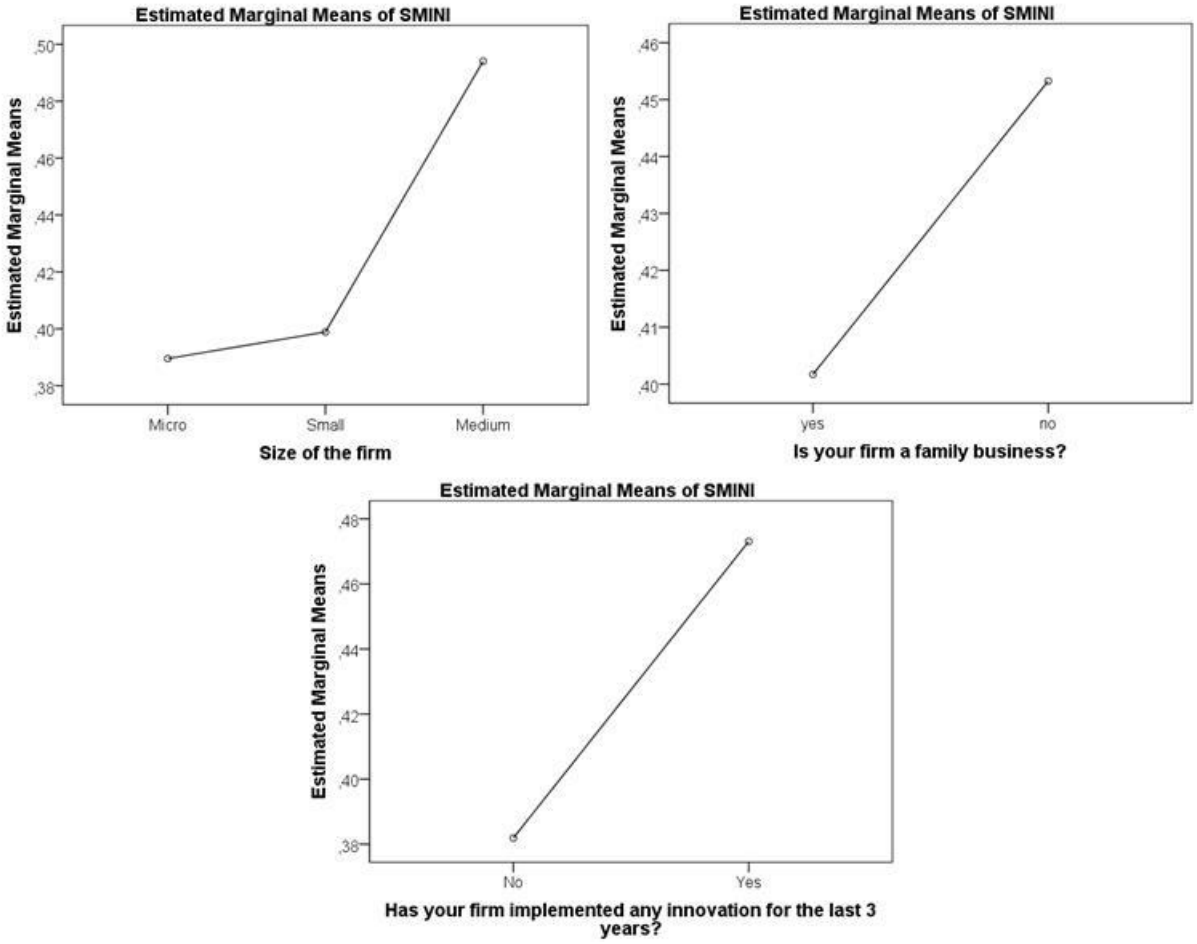

Figure 2.2. Profile plots of the variables
Source: own compilation

2.5. CONCLUSION

Small and medium-sized companies are increasingly internationalised: a considerable part of their revenues come from exports, and some of them are even involved in foreign direct investments. It is therefore important to measure the degree of internationalisation of these firms. Most of the measurement methods, indices and indicators, however, were developed to measure the internationalisation of large multinational enterprises. Therefore, we needed to develop our own measurement method.

We have compiled the Small and Medium-Sized Enterprises' Internationalisation Index (SMINI), which is calculated as an unweighted average of four components:

Export intensity, Attitude of the owner/entrepreneur/manager, Geographical scope, Complexity of strategy. The index can have a value between 0 and 1. The Visegrad country average calculated from our sample is 0.4432.

We have checked the influence of company size, company age, ownership structure, innovation activity, network participation and sectorial structure on the SMINI. All factors had a significant effect on the index value.

- The larger a firm, the higher the index value found.
- The older a firm, the higher the index value found; the connection however is very weak.
- Family-owned firms have a significantly lower index value than non-family-owned firms.
- Foreign ownership is positively correlated with the SMINI.
- The more innovative a firm, the more internationalised it is as well. Also, the more innovative the industry a firm is active in, the higher SMINI value the firm has.
- The participation in networks increases the degree of internationalisation of firms.
- The most internationalised SMEs in our sample are those operating in manufacturing, transportation and storage, and information and communication.

The relationships found in our analysis are in line with the results of other surveys and authors. The strength of the relationships, however, is low or moderate, which may suggest that there are other influencing factors in internationalisation that could not be detected with the sample and the methods we used.

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